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NOTES ON A FEW CŒLENTERATES OF WOODS HOLL.¹

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The following notes concerning a few Hydrozoa and other Cœlenterates, some new and others more or less rare, of the Woods Holl Region, and made chiefly during the summer of 1906, are published in the belief that portions of them at least are of more or less interest, particularly in view of the biological survey of the region now under way under the direction of the Bureau of Fisheries. It seems also worth while noting certain biological aspects of these organisms which are but indifferently recognized.

HYDROIDS.

EUDENDRIUM.—Among the prolific hydroid fauna of the region, few if any genera of Gymnoblastera are more abundantly represented both in species and individuals than *Eudendrium*. And among the species of *Eudendrium* perhaps none is so conspicuous in size or so abundant as *E. ramosum*. About docks, piers, in tide pools, in open waters and water of a depth of ten to twenty fathoms or more, the species is more or less abundant everywhere. Apparently the first record of the species in American waters was by McCrady in his now classic monograph ("The Gymnophthalmata of Charleston Harbor," p. 166), and by him identified with the *E. ramosum* of Europe.

It has long been a query in the mind of the present writer why, in the rather extended and painstaking work of Professor Agassiz, there seems to have been no acquaintance with this species. In his elaborate monographs on these forms he only mentions this species as a native of European waters. And in the later "Catalog of North American Acalephæ" of A. Agassiz (p. 160), it is only mentioned as having been taken by Clark in Charleston Harbor. And even as late as Verrill's "Invertebrate Animals of Vineyard Sound" (1871, pp. 408, 734), its occurrence is merely mentioned, with no account of its characteristics or

¹ Contributions from the Zoölogical Laboratory, Syracuse University.

distribution. Can it be possible that this species is a recent comer into this region, or has it become more prolific and abundant of recent years, or was its earlier presence simply overlooked by naturalists? So far as I know these queries must remain such, at least for the present. In this connection I desire to note the variable character of the species when found in deeper waters. As known in shallower habitats it is usually stout, with dense stems much fascicled and profusely branching ; while from depths of fifteen or more fathoms it is often more slender, stems weak, colony less massive and complex, and with gonads of variable colors and characters, the whole resembling somewhat *E. dispar*.

EUDENDRIUM DISPAR. — This species most resembles the preceding in its general size and aspects of any of the series. While not to be ranked as especially rare, it is yet far from common. This may be due, in part at least, to the fact that its habitat is usually the deeper waters, ten to thirty fathoms, hence only available by means of the dredge. But this does not fully explain its comparative rarity, for the writer has collected by all known means for fifteen years throughout the region, and this species has not been taken on an average once per year during this period. It may therefore be ranked at present as rather rare.

In this note it is desired to call attention to the fact of the considerable variation in morphological characters shown by the species as taken from varying depths and other environmental differences of habitat. Agassiz in the original description of the species (*Cont. Nat. Hist.*, Vol. IV., p. 286), states that the branches and pedicels are extensively annulated. Later students have generally followed Agassiz in this respect. As a rule such is true in a majority of cases, but it should be pointed out that specimens are found in which there is considerable variation, the annulation resembling much more nearly that of *E. ramosum*. Again other specimens will be found in which the annulation extends to the entire stem, as well as to the branches and pedicels. The most distinctive difference, and most constant, is to be found in the character and position of the gonophores. These I have found to be very constant, and agree quite closely with the figures of Agassiz.

In distribution the species seems to be more common in Buz-

zards Bay though I have taken it several times in the deeper waters in the region of Gay Head.

EUDENDRIUM ALBUM.—This species was first described by Nutting in 1898. In a "Synopsis of the Hydroids" (*Am. Nat.*, Vol. XXXV., p. 310), I expressed some doubt as to the distinctness of Nutting's species. During the present year I have taken two colonies of this little hydroid, which seemed to differ in important points from *E. capillare* and *E. tenue*, the species which I had considered probably identical. In comparing these several species, having obtained specimens of *E. capillare* from Naples, there seems no longer any good reasons for doubting their distinctness.

EUDENDRIUM CARNEUM.—This species, first described by Clarke, was taken at three different points during the summer, namely, from piles of the docks of the Vineyard Haven Yacht Club; from fucus off Naushon; and later dredged off Gay Head. It is not a common species at Woods Holl. In general characters it might easily be mistaken for young colonies of *E. ramosum*, but may be distinguished usually in the sexually mature stage by its smaller size, rarely exceeding two inches in height and by the flesh red color.

HYDRACTINIA.—Two points of some interest will be noted concerning the local species of *Hydractinia*, first, the rather interesting range of habitat which characterizes it; and second, some facts bearing on the question of the affinities of the species.

As is well known the more familiar habitat of the species is the shell inhabited by hermit crabs. So general is this conception on the part of zoölogists that it is often given as *the distinctive* habitat, and that because of this peculiarity it is cited as one of the more common illustrations of *symbiosis*, and not infrequently pains are taken to show just wherein these creatures sustain essential relations of mutual helpfulness and interdependence. But every careful student of hydroids knows very well that *Hydractinia* has a range of habitat which would be clearly incompatible with the foregoing conception of necessary symbiosis. Agassiz long ago pointed out in his original description of the species, *H. polyclina*, that it was to be found covering rocks in

tide-pools, sometimes to the extent of several square feet. The same fact has also been pointed out by McCrady, Leidy, and others. During the current season I have records of the following modes of life : The general occurrence on shells occupied by hermit crabs ; the maxillipeds of the lobster ; the chela of the common crab, *Cancer irroratus* ; stems of common rock-weed ; dredged in Vineyard Sound on bit of waterlogged oak timber ; finally in immense masses from piles of docks at Vineyard Haven, and still later from the carapace and legs of *Limulus*. The occurrence on the appendages of the crab and lobster are sufficiently similar to that on the shell of the hermit crab to make it devoid of special significance. But the occurrence and distribution in the other cases are certainly not compatible with any necessary commensal relations. On the other hand they go to confirm the suggestion made above, and also long ago suggested by Agassiz, that there is probably no essential advantage to this hydroid in its habitat on the shell of the crab. Certainly in the enormous colonies of the hydroid on these stationary substrata we cannot perceive any adverse conditions so far as the animals are concerned, for not only were the vegetative conditions among the most remarkable known, as shown by the enormous colonies, but they were apparently in the height of sexual development, both male and female colonies being abundant, and laden with gonads.

The second feature to be noted, as intimated above, is the question as to the specific distinctness of local species. As is well known, Agassiz regarded it as specifically distinct from the European *H. echinata*, and designated the species as *H. polyclina*. In my Synopsis (*op. cit.*), I followed Allman in his rather emphatic doubt on this point, and designated the species as *H. echinata*. In connection with the unusual numbers taken during the present season, and their range of habit, I took occasion to go carefully over the subject once more, reviewing as carefully as possible all the evidence available, and find myself unable to distinguish any good grounds for regarding these two species, so-called, as sufficiently different to warrant the distinction. And when one recalls the fact that two systematists of the acknowledged renown of McCrady and Leidy both regard our species as

identical with the European, it should call for very convincing evidence to decide to the contrary. I do not overlook the fact that Professor Nutting, who has seen the European species, believes that Agassiz's early decision was correct, but the only evidence he cites in its favor is the "larger hydranths and less number of tentacles;" of the English species, both of which characters are exceedingly variable ones, and hardly admissible alone from which to predicate specific distinction.

In some of the colonies collected during the summer I thought for a time that some such differences as Nutting indicated were present, particularly on those taken from piles. But upon a comparison of other colonies they were entirely lacking; and still other comparisons showed such apparently indistinguishable intergradations of characters that I was compelled to regard them as too variable to warrant the establishment of an independent species. I must therefore return to my earlier impression with increasing conviction, namely, that our species of *Hydractinia* is to be regarded as identical with that of European waters, and is therefore *H. echinata* Fleming, and not *H. polyclina* Agassiz.

CORDYLOPHORA. — This hydroid is known to have a very wide range of distribution, but so far as I recall at this time only a single species is known, namely, *C. lacustris* Allman. It was first found at Woods Holl by Professor Morrill in 1899, in Nobska pond, who kindly turned it over to me for identification.

Since then I have taken it in several similar ponds in the region and near Falmouth, and in fresh or brackish ponds on Marthas Vineyard. Indeed the hydroid seems to be quite generally distributed throughout the region. The more common habitat is on fragments of rock, or on bits of submerged sticks, eel grass, etc. Occasionally it forms large and rather complex colonies, the hydrorhiza forming an intricate network from which branching stems arise to a height of about an inch or slightly less. The reproductive season seems to be chiefly in spring or early summer, and sparingly in July. Colonies have been found later, September or October, but with no signs of gonophores. As I have pointed out in an earlier paper (*Zoöl. Bull.*, Vol. I., p. 205), it lives well under the artificial conditions of aquaria, but only

in its vegetative phases, no sexual organs appearing. Furthermore, if these be present when brought to the aquarium they soon show signs of degeneration, and later disappear.

CORYNITIS. — This genus was instituted by McCrady for a hydroid and medusa described by him from Charleston Harbor (*Proc. Elliott Soc. Nat. Hist.*, Vol. I., p. 131), and named in honor of Professor Agassiz *Corynitis agassizii*. Notwithstanding the fairly full description, especially of the medusa, the latter illustrated by good figures, a most remarkable confusion has crept into the literature in reference to the supposed affinities of the species. From material which has come into my possession within recent years, and from facts gathered therefrom it now seems possible to clear up the matter once for all.

About the time that McCrady described the above named species Agassiz also described a new hydroid which he designated as *Halocharis spiralis* (*Cont. Nat. Hist.*, Vol. IV., p. 239). For some unaccountable reason he subsequently came to regard this species as identical with McCrady's *Corynitis*, and on page 340 gives priority to the latter name, ranking *Halocharis* as a synonym. That this was not simply a clerical error is evident in that on page 344 he recognizes McCrady's *Zanclea gemmosa* as quite distinct from *Halocharis*, and this error is perpetuated by A. Agassiz in his "Catalog of N. Am. Acalephæ," p. 183. These errors have continued throughout the literature up to the present time, though as will be shown, it has later been determined that the medusa which McCrady described as *Zanclea*, or rather *Gemmaria gemmosa*, is liberated from a hydroid resembling Agassiz's *Halocharis spiralis*. That Murbach, who first observed the liberation of this medusa, was correct in identifying it with McCrady's *Gemmaria gemmosa*, I have abundantly satisfied myself at various times since. But he is clearly in error in attempting to identify it with McCrady's *Corynitis*, due no doubt, to the earlier error of Agassiz as already pointed out. Murbach is also in error in attempting to distinguish a generic difference between Agassiz's *Halocharis* and the *Gemmaria* of European writers, as I have elsewhere pointed out (*Mitt. Zool. Sta. Neapel*, Vol. XVI., pp. 574-577, "Medusæ of Woods Holl," 1904, p. 42).

In the summer of 1904 the writer described an apparently new species of hydroid from Long Island Sound, namely, *Syncoryne linvillei* (BIOL. BULL., Vol. VII., p. 351). Not having access at the time to McCrady's monograph, and with the current confusion above referred to still more or less dominant, the details of McCrady's description of *Corynitis* were wholly overlooked. A more recent and critical examination of this has clearly convinced me that the hydroid in question is quite identical in its generic relations with *Corynitis*, and should be so ranked hereafter. Whether it is specifically the same as *C. agassizii* must remain more or less uncertain, at least till it may be possible to have specimens of free medusæ for comparison, these having been lacking in the material from which my description was drawn.

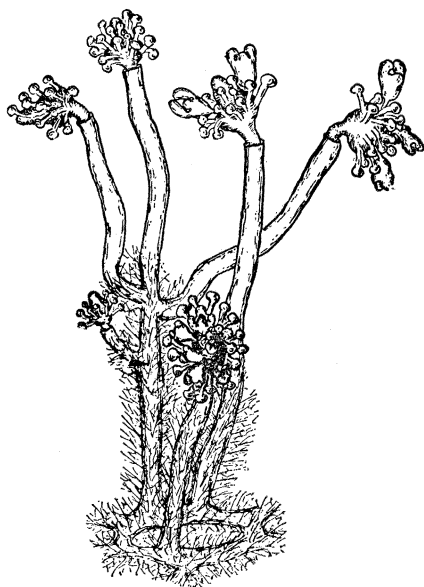


FIG. 1.

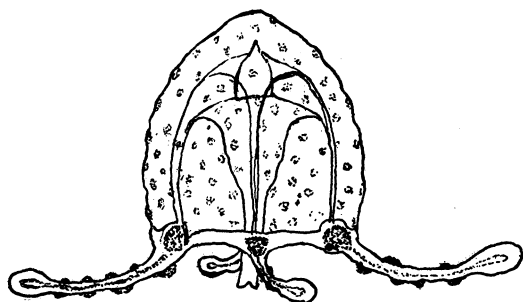
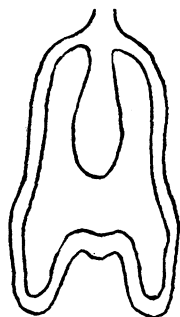
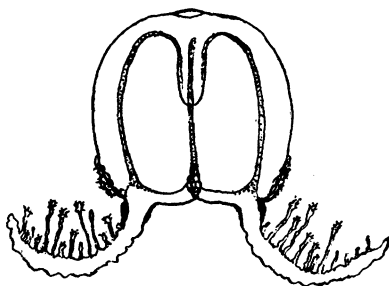
That there may be no doubt whatsoever as to the facts concerned, or of the confusion alluded to, it seems worth while to present several of McCrady's figures with others, and to include also some summary of his descriptions.

Concerning the *hydroid*, his description is rather inadequate and indefinite. "The larva is a coryne with a short, thick polyp and few tentacula. The medusa-buds borne in the usual position, and the peculiar character of the tentaculiferous bell-margin is conspicuous at an early age." Of the habitat of the hydroid he says: "The coryne which bears this medusa is rather rare, as is also the medusa. It is found growing on sponges a little above dead low water mark. It has been found during the summer months and whether or not it exists during the winter

(as in all probability it does), has not been ascertained. A young bitentaculate, but free medusa, has been found as early as the fifth of June. A fully developed specimen has occurred in the end of July, while as late as the twelfth of September, buds were still produced from the coryne, Figs. 6, 7 and 8 having been drawn at this date. This leads me to say that I have not seen the actual separation of a bud from the hydroid, and its assumption of the form of Fig. 5. My confidence that they are one and



FIG. 2.

FIG. 4. *Corynitis agassizii*. (McCrady.)FIG. 3. *Corynitis*.
(McCrady.)FIG. 5. *Gemmaria gemmosa*. (After McCrady.)

the same is due to the very marked and almost unmistakable peculiarities of the medusa, which are fairly exhibited in the buds while attached to their hydra."

As will be seen, there is little here from which one might attempt to identify the hydroid. Aside from the fact that it is designated as a corynid, and that it has a short thick hydranth with

few tentacles, the medusa-buds in the "usual position," no morphological features are given. The habitat and association with the sponge are interesting facts, but without taxonomic significance.

It is unnecessary to repeat here the characters by which *Syncoryne linvillei* is distinguished. A glance at the figure (1) of a portion of a colony, with the reference already cited, will suffice to afford ample opportunity for comparison to those concerned. I may add, however, as was intimated in the original description, that while having generic characters in many points conformable with those of *Syncoryne*, still there are points of considerable difference. And with McCrady's figures and description before one it is at once apparent that my species belongs to *Corynitis* and not to *Syncoryne*, as already intimated.

A comparison of the several figures of *Corynitis* and *Gemmaria* will make more evident the points under consideration. For ex-

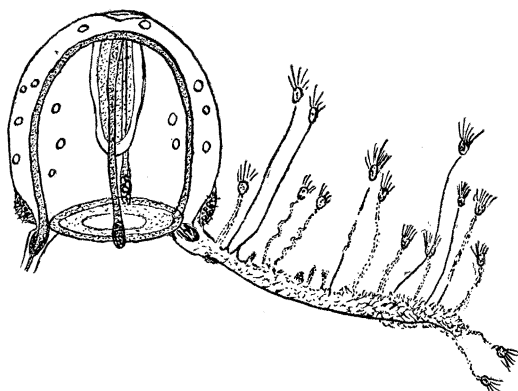


FIG. 6. *Corynitis agassizii*. (After Murbach.)

ample, a comparison of Figs. 2 and 3 which represent corresponding stages in the medusæ of *Syncoryne linvillei* and *Corynitis agassizii* will strongly suggest their close resemblances and probable generic identity, as already indicated.

Futhermore, a comparison of Fig. 4, representing the free medusa of *Corynitis agassizii*, taken directly from McCrady's drawing, with Figs. 5, 6 and 7, representing medusæ of *Gemmaria*, will also show one at a glance the unmistakable distinctness of the medusæ portrayed. Fig. 5, copied from McCrady, represents

his well-known genus *Gemmaria*. Fig. 6, copied from Murbach's figure of *Corynitis*, confused by him with the very different genus of this name, gives a good picture of the medusa of *Gemmaria gemmosa*, to be discussed in the following section. Likewise, Fig. 7, from the writer's description of *Gemmaria implexa*, also shows beyond doubt the distinctive gemmarian features.

With these figures, and facts cited bearing upon the problems concerned, there can hardly be reasonable doubt as to the con-

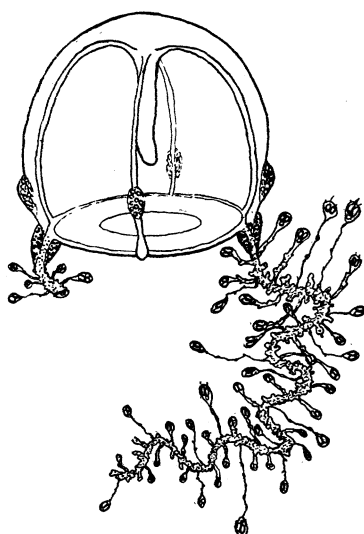


FIG. 7. *Gemmaria implexa*.
(Naples.)

clusions to be drawn. *Syncoryne linvillei* must be identified with the genus *Corynitis*; and the *Corynitis* of later literature must be identified with the genus *Gemmaria* of McCrady.

It is therefore to be hoped that the long-standing confusion here referred to may be once for all removed by recognition of the facts as given. And while it is too much to anticipate that similar confusion along kindred lines may be avoided entirely, the lessons of past experience should count for something in rendering their occurrence less frequent, or of such persistence.

GEMMARIA. — Attention has been directed to the confusion of McCrady's *Gemmaria* with his very different genus *Corynitis*. A similar confusion has also been more or less current as to the relations of *Gemmaria* and *Zanclea*. The latter was instituted by Gegenbaur for a medusa found at Messina, and recognized by McCrady as having certain points of similarity to his doubtful *Gemmaria*, which he believed however, to be quite generically distinct from *Zanclea*.

Having taken a medusa at Woods Holl during several years which is now well known as identical with McCrady's *Gemmaria*, and having kept these medusæ at various times and for considerable periods in the laboratory, I am convinced that they are beyond

doubt generically different from *Zancklea*. Briefly diagnosed, *Zancklea* was described by Gegenbaur as having four short oral lobes, four radial canals and the same number of marginal tentacles, the latter with numerous secondary appendages (Anhängen).

In at least two aspects there are important differences in *Gemmaria*, viz., the mouth is not marked by any distinguishable lobes or lips ; and second, there are only two marginal tentacles. These latter do not increase in number with age, so far as one may judge by having them long under observation. This is likewise true of *Gemmaria implexa*, taken by the writer at Naples, and described briefly in a paper in the Naples Mittheilungen (Bd. XVI., p. 574).

It would seem therefore that the genus *Gemmaria* of McCrady must be recognized as founded on thoroughly good characters, and that is it quite distinct from *Zancklea* of Gegenbaur. Hence we must also accept McCrady's *G. gemmosa* as a distinct species, and this name must entirely supplant that of *Corynitis agassizii*, as pointed out in the preceding section.

Colonies of the hydroid are quite frequently taken at Woods Holl, and from a considerable variety of habitats, *e. g.*, on shells of *Mytilis*, *Pecten*, serpulid tubes, pebbles dredged from various depths, pieces of waterlogged wood likewise dredged from similar depths, and from floating *Sargassum*. In one particular, however, there has been an interesting uniformity in every case which has come to my notice, namely, the colonies are invariably associated with encrusting polyzoa, usually *Schizoporella* or *Membranipora*, and almost always with those colonies characterized by pinkish or orange colored pigment, affording a background which resembles very remarkably the color of the hydroid. The hydro-rhiza forms an intricate network over the polyzoön, but so far as I have been able to perceive there is no special evidence of mutualism between the organisms.

The following note concerning the peculiar netting organs of the medusæ may not be amiss. The extension of the stalk bearing the netting organ is apparently brought about by a sort of rotary, or oscillatory motion of the capsule, involving a spinning-like operation by which the thread becomes extremely delicate almost to the point of invisibility. After attaining its full extension the capsule continues its motion for a variable time,

when the stem finally contracts in a way to suggest that of *Vorticella*, though without the coiling of the stem as in the latter organism. I am inclined to regard the organ as probably possessed of a tactile function.

ECTOPLEURA. — While dredging off Gay Head on board the "Fish Hawk," July 15, 1907, I was fortunate in discovering on the carapace of a small specimen of the common spider crab, *Libinia*, among other hydroids not uncommon on this creature, including a species of *Campanularia* and *Halecium articulatum*, a small tubularian-like hydroid having a very short stem, large hydranth, the latter being crowded with racemose clusters of medusa-buds, some almost ready to be liberated. In appearance the hydranth, in its size and general aspects, was much like *Tubularia crocea*, though rather larger, and the oral tentacles fewer in number. A closer inspection under a lens, and later under the low power of the microscope, soon made it evident

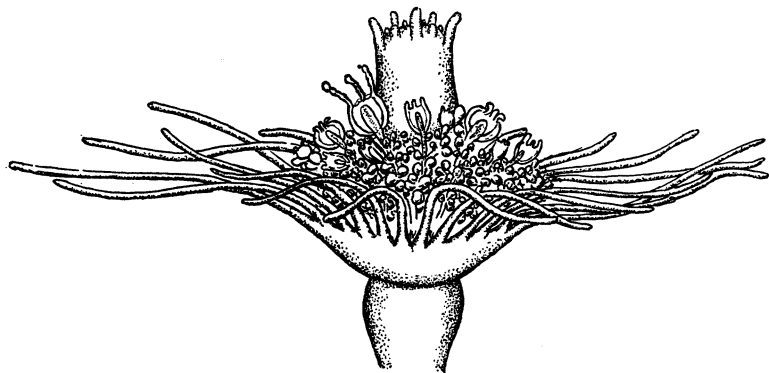


FIG. 8. *Ectopleura prolifica*.

that the specimen did not belong to *Tubularia*, and the liberation soon after coming to the laboratory of several medusæ made this doubly certain. An examination of the medusa soon showed that we had under examination a species of *Ectopleura*. Since no description of the hydroid of this genus has been recorded from this region it seemed worth while to have a careful sketch made of it, which is shown in Fig. 8.

The following are the chief points of diagnostic importance. Stem of hydroid very short, hardly exceeding 5 or 6 mm., and

devoid of definite perisarc. (This may be due in part to the habitat, on the crab, these animals being given to decorating themselves with various living organisms, such as hydroids, polyzoa, algæ, etc., and if this hydroid were there by such process its very short stem devoid of perisarc may be due to its recent transplantation.) The hydranth is rather large, with two whorls of tentacles, the basal series about twenty-four in number, long, and filamentous, much as in *Tubularia*; oral tentacles few and short, about ten or twelve, apparently in two series, one *very* short, merely bud-like. Hypostome of hydranth rather cylindrical, entire hydranth low vasiform, and with definite constriction below the body.

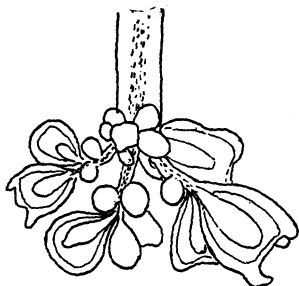


FIG. 9.

Medusa-buds borne on body of hydranth in series of racemose clusters, as shown in Fig. 9. Growth of medusæ apparently rapid, the older forming the terminal portion of the cluster. Color of hydranth pinkish red, tentacles paler.

MEDUSA. — Bell transparent, subspherical or when older oblatly spheroidal; diameter when first liberated about .5 to .6 mm., and becoming but little larger after several days in the laboratory. Walls of bell rather delicate, though not flabby; velum very delicate, with tendency to evert during contraction. Radial canals four, rather open showing free movement of circulating fluid. Tentacles four, rather short, and terminating in knob-like masses of nematocysts, body of tentacles with nematocysts in scattered clusters of four to six in number usually, though some specimens seemed all but devoid of them. The entire exumbrella of newly-born medusæ is more or less dotted with clusters of nematocysts. A characteristic feature of the medusa is the presence of eight rows of nematocysts arching over the exumbrella from the basal bulb of each tentacle, a row on either side. Basal bulbs rather prominent, and with scattered granules of pigment throughout their substance. Manubrium relatively large or thick and not extending at any time to the level of the velum, mouth devoid of lobes or lips of any sort.

Color. — Bell very transparent, or with only the slightest tint of color by reflected light ; tentacular bulbs and base of manubrium brownish red due to the presence of scattered pigment granules in the entoderm ; tip of manubrium slightly bluish by reflected light. While the colors may be easily distinguished they are incomparably inferior to those of *E. ochracea*, a very nearly related species.

Dr. A. G. Mayer has informed me that the hydroid of *E. ochracea* has been taken by him at Newport and that it has much in common with the hydroid here described. The characters of the medusa are, however, very different from that of the former.

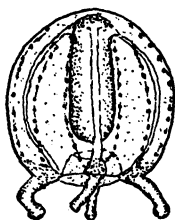


FIG. 10. Aspect of newly born medusa.

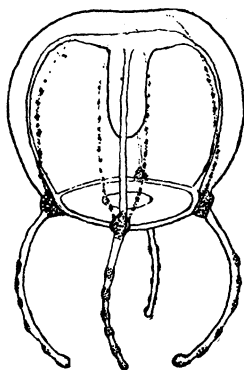


FIG. 11. Aspect of fully developed medusa.

Having taken those medusæ by hundreds for many years one could hardly confuse them with any other known species. It had seemed possible that this might be identical with McCrady's *Sarsia turricula* but a careful comparison of the original figures and description makes it perfectly certain that the species are wholly different ; indeed I am inclined to believe that *S. turricula* is evidently of a different genus, as McCrady has indicated, and that Agassiz was in error in placing it under his newly established genus, *Ectopleura*. The only species with which the present one is at all comparable is the *Tubularia dumortierii* of Van Beneden, but here again there are points of difference, especially in the size and features of the medusa. It seems therefore rather probable that we have here a new species, or in any case a variety

entitled to identity, hence I am disposed to suggest for it the name *E. prolifica*, which may be specific or varietal, as the results of later comparison of material may warrant.

AGLAOPHENIA. — During the summer I collected from masses of *Sargassum* which was blown into the harbor from Vineyard Sound, a species which seems in all essentials identical with Fewkes' *A. minuta*. The hydroids were entirely devoid of gonangia, as was the case with the species as originally described by Fewkes, whose account was extremely brief, and without figures — "Found growing in great abundance on an Alga over the fronds of which the *hydrorhiza* extends." (*Bull. Mus. Comp. Zööl.*, Vol. VIII., p. 132.)

Nutting has since described and figured the gonangia, using material collected by Fewkes, and indicated as types, though as already mentioned, the original description made no mention of the gonosome.

In a recent paper on "Bermuda Hydroids" Mr. E. D. Congdon has a brief note on the species, found there on *Sargassum*, but as in my specimens, devoid of gonangia.

So far as I am aware, the present is the first record of the species at Woods Holl, and this mention of it seems therefore important.

OBELIA. — The present note refers only to a single species, and of that only to the medusa, which up to the present time, seems to have been entirely unknown, or at any rate undescribed.

The material was collected by Mr. Geo. M. Gray at Woods Holl in April, 1906, and in the aquarium numerous medusæ were liberated. The hydroid was clearly *O. flabellata* Hincks.

The following synonymy is given by Haeckel, "Das Syst. d. Medusen," p. 177 :

Thaumantias plana Sars., 1835.

Campanularia flabellata Hincks, Ann. Mag. Nat. Hist., 3d, Vol. XVIII., p. 297.

Obelia flabellata Hincks, Brit. Hydr. Zoöphytes, p. 157.

Eucope plana Agassiz, Cont. Nat. Hist. U. S., Vol. IV., p. 351.

Obelia plana Haeckel, vide supra.

There would seem therefore to be more or less uncertainty as to the exact affinities of the species, as will appear in what follows. As to Agassiz *E. plana* there is no description. Hincks' description relates only to the trophosome and is thus far clear and sufficient. But of the medusa he gives no account, and indeed states that it is unknown, or doubtful.

Haeckel's description relates only to the medusa, but is apparently entirely inapplicable to our species. *E. g.*, his species has forty-eight tentacles at birth, and at maturity from 100-120. Diameter of new-born medusa 1 mm., and at maturity 6 mm. Gonads on distal half of radial canals.

The following characters are diagnostic of our species:

In general features quite comparable with other well-known

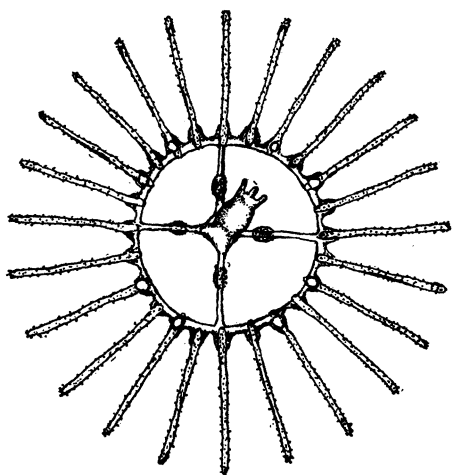


FIG. 12. *Obelia flabellata*.

medusæ of *Obelia*. In common with others the creature has the habit of everting the bell at will, and again recovering its shape. Radial canals 4, gonads ovoid in shape and borne about midway between stomach and margin of bell, well-developed at birth. Tentacles 24 in number at birth, number in adult not known. Manubrium rather large, mouth four-lobed. Diameter of medusa at birth .4 to .5 mm. Size in adult not known.

Hence as was suggested above, it seems quite evident that Haeckel's species is not identical with that of Hincks, as shown

by the foregoing comparisons. Fig. 12 gives a general view of the medusa as seen from the subumbrellar surface.

AGLANTHA CONICA. — This species was collected by the writer in August, 1902, and described shortly after (BIOL. BULL., Vol. VI., p. 21). It has not since been taken till the present summer, or spring, when, April 25–30, it appeared in small numbers in the tow at Woods Holl. These specimens agreed in all essentials with those of 1902, except in a slightly larger range of size. In the former specimens the average height of bell was given 5–6 mm. In the specimens of this year, only about a dozen in number, the average was about 8 mm. in height. The marginal tentacles were quite as in the earlier description, and there were no apparent morphological differences between the smallest specimen taken, of 5 mm., and the largest, measuring 12 mm. These facts seem to confirm the previous somewhat provisional designation of the species as new, and warrant the belief that *A. conica* is a well-defined species, distinct from the only other indigenous species, *A. digitalis*. Its occurrence at such widely different seasonal periods as August and April is a point of some biological interest. The gonads were about equally developed in the specimens of each season, and this may also suggest that it has no sharp limits as to seasonal relations.

As a supplementary note it may be added that again specimens have been taken at Crab ledge in late July, 1907, in considerable numbers by towing, as in my original collections, and agreeing in every respect with the original type specimens.

EUTIMA. — Two species of *Eutima* have been recognized by earlier students of Hydromedusæ, namely, *E. mira* McCrady, and *E. limpida* A. Agassiz. In notes by the present writer (*Am. Nat.*, Vol. XXXVI., p. 554), reference was made to *E. limpida* as "Fairly common at Woods Holl, but sexually immature." Upon later and more critical comparison of these medusæ I found it extremely difficult to distinguish more than a single species, and so designated it as *E. mira* McCr. (cf. *Bull. U. S. Bureau of Fisheries*, 1904, pp. 45, 46), though listing *E. limpida*, on the authority of Agassiz, but with the suggestion that it was probably at most but a regional variety of *E. mira*. Still later observations have served to confirm this impression.

LOVENELLA GRANDIS. — This species was first described by Nutting from material dredged in Newport Harbor in 1901. So far as I am aware it has not since been taken. Specimens of the hydroid have since been obtained by the writer at Woods Holl. The colonies were somewhat fragmentary, but still justified Nutting's designation of it as "a beautiful species," and one could wish it were more abundant.

SERTULARIA VERSLUYSI. — For the first time this interesting hydroid has been found at Woods Holl during the present summer. Its habitat on *Sargassum* renders it not unlikely that this is not the first time the species has drifted into these waters, but failed of recognition. Congdon has also taken it on drifting *Sargassum* at Bermuda. A feature of the specimens taken by me, and not mentioned by other observers, is the presence of stolon-like outgrowths from the tips of branches and stems. These are more or less common on my specimens, and it seems somewhat strange that they should not have been observed before.

Rhegmatodes. — This beautiful medusa (*R. tenuis* A. Agassiz), occurring at very irregular periods, and in a very erratic manner, made its appearance during the first week of September, 1907, in considerable numbers and in its characteristic manner. During the last week in August a very few small and immature specimens were taken in the tow, and suddenly large numbers of full-grown medusæ appeared in Buzzards Bay adjacent to Woods Holl, hundreds of which were obtained with dip nets. On the following day not a single specimen could be found. The presence of wind and some rain may have been influential in some measure in the sudden disappearance, but perhaps not entirely. This is the first time the species has been seen in numbers since the summer of 1900.

CAMPANULARIA. — In assorting some specimens in the collections of the Fisheries laboratory a single valve of *Modiolus* was found on which several specimens of a species of *Campanularia* were found which at first inspection seemed rather strange. A closer examination showed them to belong to the species *C. verticillata* (Linn.).

While Nutting lists this species in his "Hydroids of the Woods Hole Region," it is apparently on the authority of Verrill, who records the species as having been taken in the region of Block Island, and in Fisher's Island Sound. The specimens hereunder mentioned were obtained by Vinal N. Edwards off Sankety Light, Nantuckett, from a depth of 25 fathoms. This would seem therefore to be the first definite record of the species from the immediate region, if indeed this may be so designated.

A few points as to structural features seem worthy of note. One interesting fact not hitherto mentioned in its morphology, though well known in the fascicled stems of the Plumularidæ, is the intercommunications of the several stem elements by means of strands of cœnosarc, adjacent tubes showing very clearly such connecting strands. This may be seen in the enlarged drawing, Fig. 17. It is most evident near the apical region, and probably occurs during rapid growth. Another point not mentioned, though probably known, is the variable number of stems in a given fascicle. In young specimens the tubes were as few as five, while in others they were more numerous. Fig. 16 shows the general aspects of a colony.

In size my specimens varied from 20 to 30 mm. in height, the stems ending abruptly at the distal end, as shown in the figures.

No gonangia were present on any of the specimens. This fact with that of the small size of the specimens, would seem to indicate their immaturity.

LAFCEA. — On the same shell from which the previous specimens were taken I also found a species of *Lafcea* of whose exact relations I am in some doubt. There were features which at first inclined me to regard it as *L. gracillima*. Further comparison showed still other features allying it with *L. pocillum*. Unfortunately, the specimens had been allowed to become dried up before they were recognized, hence the uncertainty in their identification.

A single gonosome was found encasing in part a stem of *Tubularia* on which the colony was growing, and in part the stoloniferous portion of the colony. Its features were very much like that figured for *L. dumosa*.

PASYTHEA. — Among hydroids obtained from the gulf-weed were found extensive colonies of what seems clearly to be a species of *Pasythea*, a genus hitherto unrecorded anywhere within our northeastern Atlantic coast region. Indeed only a single species of this genus is recorded from American waters (Nutting, "American Hydroids," Part II., p. 75), namely *P. quadridentata* Lamx., specimens of which he reports from the British West Indies. From a careful comparison of Nutting's figures and description, as well as those of Lamarck, Lendenfeld, and others, my specimens seem to have so many points of difference as to suggest the probability of their being undescribed. Hence it seems important that a rather full description be undertaken, which is given below.



FIG. 13.

Trophosome: Colony consisting usually of a simple unbranched stem, varying in height from 4 to 9 mm., or averaging about 6 or 7 mm., and rising from a creeping hydrorhiza which forms an intricate network over the stems and leaves of the alga. The stem is divided into a series of internodes by oblique nodal articulations, as shown in Fig. 13. Each of these internodal segments bears from one to five pairs of opposite, and closely appressed, hydrothecæ, the mouths of which are quite divergent as shown in the figures, especially in internodes having several pairs, the terminal pair of which in such cases are much less so, owing no doubt to the absence of pressure from above. The number of internodes varies greatly on different stems, as is shown in the accompanying table. The average, estimated from a series taken more or less at random, seems to be about five, though this is probably somewhat dependent upon age or conditions of growth. Furthermore, the size of internodes is likewise variable, even more than their number. This is largely a matter of the number of hydrothecæ upon a given internode. A glance at the table, and a comparison of the figures, will make this quite obvious without extended verbal description. Usually

the lower, or basal internode contains the fewer pairs of hydrothecæ, one or two, or rarely three pairs, and the more distal nodes a larger number. But this again is subject to great variations. It might appear as if these nodulated stems were so many expressions of rhythms of growth, in which there would naturally be a gradual increase in the size of successive internodes up to the optimum, followed by a corresponding decrease in size as the organism passed this optimum of activity. And many stems show just this feature in a very striking way. On the other hand there are so many exceptionally different examples as to throw serious doubt upon the suggestion.

Margins of hydrothecæ are usually characterized by two or three, rarely four, tooth-like processes, but occasionally specimens are almost smooth, or entire. There seem to be two or three opercular flaps closing the mouths, though this feature is difficult of certain demonstration.

Gonosome, entirely unknown.

TABLE SHOWING NUMBER OF INTERNODES, AND PAIRS OF HYDROTHERCÆ ON EACH, FOR TEN COLONIES TAKEN AT RANDOM.

No. of pairs of hydrothecæ on each internode.	I.	II.	III.	IV.	V.	VI.	VII.	Number of Internodes.
	2	3	3					
	1	4	3	4				
	3	4	2	5				
	3	2	3	with terminal stolon				
	2	3	3	4	4	3		
	3	3	3	3	4	4	3	
	2	3	3	3	5			
	2	3	5	4	2	4		
	3	4	3	4	4	3	3	
	2	3	5	4	3	with two terminal stolons		

Among the more distinctive differential characters of the species as compared with *P. quadridentata* are :

1. The apparently larger number of internodes to each stem, seven being not uncommon, and in one case eight were present. In *P. quadridentata* the number as given by Nutting is two, or occasionally three or four.

2. The larger number of pairs of hydrothecæ to each internode. This feature will be quite apparent from the table. In the other species the number is only two or three.

3. The rather stouter and shorter nodal portion of the stem. Nutting's figures show these much more slender and long.

4. The tendency in certain stems to form divergent branches from the sides of the internodes, as shown in Fig. 15.

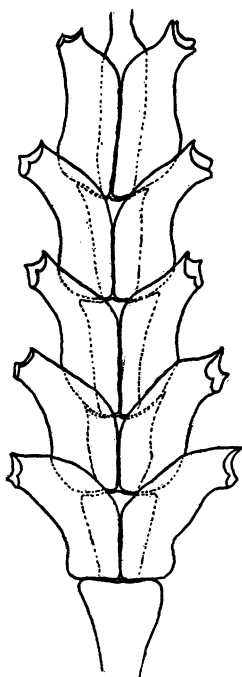


FIG. 14.

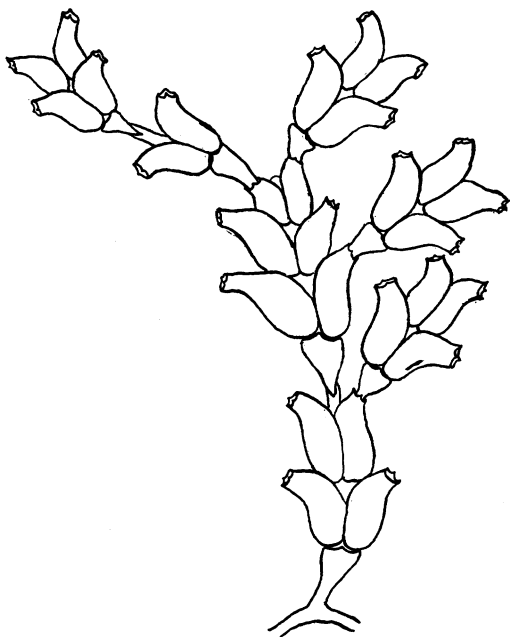


FIG. 15.

5. The very common and rather distinctive occurrence of terminal and lateral stolons on the stems, from which at irregular intervals secondary stems arise.

It is much to be regretted that no gonangia were present on any of the specimens, as this would have afforded almost certain proof as to the affinities of the species. It may be found that when specimens are obtained from other localities and in larger numbers, though the numbers in the present case were large, the present species will have only a varietal importance. Still, I am

strongly inclined to believe that it is quite distinct and probably new, and hence will propose for it the name *Pasythea nodosa*, the name being suggestive of a highly distinctive feature of the hydroid, namely the nodose aspect of the stem.

Fig. 14, single internode enlarged. Fig. 15, colony with branches.

Distribution and Habitat.—Known only on floating *Sargassum*.

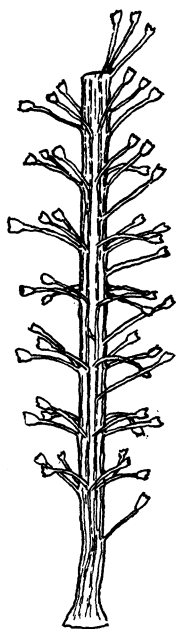


FIG. 16.

Campanularia verticillata.

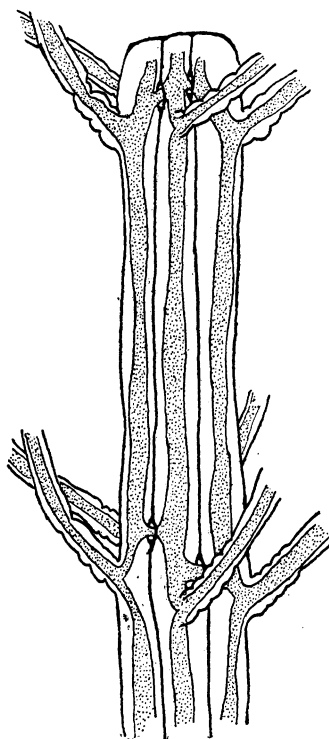


FIG. 17.

ANEMONIA SARGASSENSIS. New species.

During the summer a very interesting species of actinian was found by the writer in a mass of *Sargassum* brought in by Mr. Edwards from the sound, and in working over some material collected during the preceding summer other specimens were found to have been taken by Mr. Edwards and preserved in

formalin. An examination of the literature at hand failed to give any clue as to their specific, or even generic relations. Subsequent investigation pointed to more or less close affinities of the genus *Anemonia*, of Risso. But there seems little doubt of the fact that the species has not hitherto been described. The following summary of characters will suffice for its general features, and a more detailed account of its anatomical features will shortly be published in another communication.

Column short and irregular in shape, about half as high as broad. Column obscurely fluted, and with pedal disk well developed and adapted to clasping the sea weed, to which it adhered with tenacity. Oral disk characterized by a series of white or cream-colored radiating lines extending from the mouth to the bases of tentacles or even slightly outward on the bases of the larger ones.

Tentacles cylindrical in shape, but slightly contractile, though more or less prehensile at the distal portions; the number varying with size, from 25 to 30 in smaller specimens, to about 50 in the larger, and in length from 5 to 15 mm., tapering to acutish ends, the inner series nearly twice the diameter of disk. The tentacles also are definitely adhesive, sticking to anything with which they come in contact. In several cases bifurcated or forked tentacles were found, adding to the more or less irregularity and asymmetry of these organs.

There are no acontia, nor marginal tubercles. Color a more or less diffused brownish or chestnut, variegated by the whitish markings on tentacles and disk, giving to the creature a close resemblance to the olive brownish color of the *Sargassum*, and rendering its presence difficult of detection. It shares this feature in common with perhaps the large proportion of the fauna of the *Sargassum* forest.

SUPPLEMENTARY NOTE.

Since the foregoing notes were written and about to be sent to press I have received Hartlaub's admirable paper "Craspedote Medusen" (Part XII. of Nordisches Plankton), in which he discusses certain problems relating to *Gemmaria* and *Zanclea*. With most of Hartlaub's views my own will be seen to be in substantial agreement. Concerning his contention as to the

identity of the genera *Gemmaria* and *Zanclea* of McCrady and Gegenbaur I should have to dissent, at least until such time as more convincing evidence than is at present adduced shall be submitted. Reasons for this will be seen in what has been said in the sections dealing with these subjects. It seems desirable, however, to offer a few additional suggestions bearing upon the matter.

Admitting the doubt expressed by McCrady as to the distinctness of his proposed genus, which was only what might have been expected under the circumstances, the fact must not be overlooked that subsequent students of medusæ have generally accepted without hesitation the validity of McCrady's genus. A. Agassiz who was quite familiar with the medusæ of *Gemmaria* has described a second species under it, namely, *G. cladophora*; and in a comparison of *Gemmaria* and *Zanclea* says: "The form of the bell, of the digestive cavity and of the tentacles are totally different in the two genera" ("Cat. N. Am. Acalephæ," p. 185).

Haeckel also has always recognized the distinctness of the two genera, and has himself described a new species under *Gemmaria*, namely, *G. sagittata*. He says: "Up to the present time the genus *Zanclea* has been represented only by a Mediterranean species, *Z. costata* from Messina. L. Agassiz added to this two other species, *Z. ambigua* and *Z. gemmosa*. Of these however, the first is to be placed under *Pteronema*, the latter under *Gemmaria*." ("Syst. der Medusen," p. 102.)

In Hartlaub's revised definition of *Zanclea* he has naturally enlarged that of Gegenbaur in order to include under it medusæ hitherto described under *Gemmaria*. But in so doing he fails to submit any grounds of sufficient warrant for a measure thus radical. Let it not be overlooked that thus far the ontogeny of Gegenbaur's medusa is wholly unknown. And furthermore, that even the medusa itself has been rarely seen, or certainly identified by later naturalists.

I do not overlook the circumstance that Browne has described specimens of *Gemmaria implexa* having four tentacles, which he seems to regard as older specimens of those which when first liberated have but two tentacles. This however is merely an *inference*, for he has not traced these four-tentacled specimens to

their hydroid, and until this is done the matter must remain an open question. The same objection must be urged concerning a similar inference on the part of Hartlaub, in which he would identify Gegenbaur's *Z. costata* with that described by the writer at Naples and referred (doubtfully) to *Gemmaria implexa*. Therefore the attempt to identify and unite *Gemmaria* with *Zanclea* must be regarded as unwarranted and inadmissible, and hence premature.